

BEC 101
[ENGINEERING MATHEMATICS-I]

UNIT-I

DIFFERENTIAL CALCULUS: Expansion of functions by Maclaurin's and Taylor's theorem. Partial differentiation, Euler's theorem and its application in approximation and errors, Definite Integrals, Definite Integrals as a limit of a sum, Its application in summation of series, Beta and Gamma Functions, Double and Triple integrals, Curvature : Radius of curvature, centre of curvature.

UNIT-II

DIFFERENTIAL EQUATIONS: Linear Differential Equations with Constant Coefficients, Clairaut's Equation, Cauchy's Homogeneous differential Equation, Simultaneous differential Equations, Method of Variation of Parameters, Numerical differentiation, Numerical integration by Trapezoidal rule, Solutions of one dimensional heat and wave equations.

UNIT-III

MATRICES: Rank of a matrix, Solution of Simultaneous equation by elementary transformation, Consistency of System of Simultaneous Linear Equation, Symmetric, skew-symmetric and orthogonal matrices, Determinants, Eigen Values and Eigen Vectors, Cayley-Hamilton Theorem and its Application to find the inverse.

UNIT-IV

FOURIER SERIES: Introduction of Fourier series, Fourier series for Discontinuous functions, Fourier series for even and odd function, Half range series, Fourier Transform, Definition and properties of Fourier transform, Sine and Cosine transform.

UNIT-V

LAPLACE TRANSFORM: Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property, Laplace transform of the derivative, Inverse Laplace transform & its properties, Convolution theorem, Applications of L.T. to solve the ordinary differential equations.

REFERENCE BOOKS:

1. Higher Engineering Mathematics by B.S Grewal, Khanna Publication
2. Engineering Mathematics-I & II by D.K. Jain
3. Engineering Mathematics-I & II by D.C. Agarwal
4. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India OR D.G. Guffy

BEC 102
[APPLIED PHYSICS]

UNIT-I

Quantum Physics:

Concept of Quantum theory. Wave-particle duality, Matter waves, Group velocity, phase velocity and their relationship. Uncertainty principle with elementary proof and applications (determination of position of a particle by a microscope, non-existence of electron in nucleus, diffraction of an electron beam by a single slit). Compton effect and Compton scattering. Schrodinger wave equation: time independent & dependent, Eigen functions & Eigen values, particle in a box.

UNIT-II

Wave Optics: Interference:

Fresnel's biprism, Interference in thin films (due to reflected and transmitted light), interference from a wedge shaped thin film, Newton's rings and Michelson's interferometer, experiments and their applications. Concept of polarized light, Brewster's law, Double refraction, Nicol prism, quarter & half wave plate.

UNIT-III

Nuclear Physics:

Nuclear properties. Nuclear models: Nuclear liquid drop model (semi empirical mass formula), nuclear shell model, Nuclear fission and Nuclear fusion, Chain reaction. Linear Particle accelerators: Cyclotron, general description of Synchrotron, Synchrocyclotron, and Betatron. Geiger-Muller Counter, Uses of Bainbridge and Auston mass Spectrographs.

UNIT-IV

Material Science, Superconductivity & Semiconductors:

Dielectric materials, Polarization mechanisms, Dielectric Loss, Basic ideas of Dia, Para, Ferro & Ferri, Ferrites. Piezoelectricity and its Applications, Magnetostriction, its applications in production of Ultrasonic waves, Superconductivity, Meissner Effect, Type I & Type II superconductors. Distinction between conductor, semiconductor & insulator, conduction band, Intrinsic and extrinsic semiconductors. Pn junction diode, Zener diode, npn / pnp Transistors,

UNIT-V

Lasers & Fibre Optics:

Spontaneous & Stimulated emissions, Einstein's Coefficients, Population Inversion, Pumping Mechanisms, Components of a laser System, Three & four level laser systems; Ruby, He-Ne, CO₂ and semiconductor Lasers. Introduction to Fibre Optics, Acceptance Angle, Numerical Aperture, Normalized frequency, Classification of optical fibres, Modes of propagation, material dispersion & pulse broadening in optical fibres. Applications of optical fibres.

REFERENCE BOOKS:

1. Quantum Physics by Satya Prakash
2. Engineering Physics, Malik; HK, Singh; AK, Tata McGraw Hill,
3. Materials Science & Engg., Raghvan V., Prentice Hall of India.
4. Concepts of Modern Physics, Beiser; A., Mahajan; S., Choudhary; SR, Tata McGraw Hill.
5. Solid State Physics, Dan Wei, Cengage Learning.
6. Introduction to Solids, Azaroff LV, Tata Mc Graw Hill.

7. Physics; A calculus based approach (Vol. I & II) Serway;
8. Materials Science & Engineering, Callister; WD, John Wiley & Sons.
9. Lasers & Optical engineering, Dass; P, Narosa Publishers.
10. Optical Fibre system, Technology, Design & Applications, Kao; CK, McGraw Hill.
11. Laser Theory & Applications, Thygrajan; K, Ghatak; AK, Mc Millan India Ltd.
12. Handbook of Electronics, V.K.Mehta

LIST OF EXPERIMENTS:

1. Newton's Rings.
2. Resolving Powers- Telescope, Microscope and Grating.
3. Spectrometers-R.I., Wavelength, using prism and grating
4. Experiments connected with diodes and transistor.
5. Measurement of energy band gap of semiconductor.
6. Photometer
7. A.C. Mains

BEC 103
[ENGINEERING MECHANICS]

UNIT I

Fundamentals of Mechanics: Mechanics and its relevance, concepts of forces, laws of mechanics - parallelogram law, Lami's theorem, law of polygon, concept of free-body diagram, centroids, center of gravity, area moment of inertia, mass moment of inertia – simple and composite planes.

UNIT II

Friction: Laws of friction, static friction, rolling friction, application of laws of friction, ladder friction, wedge friction, body on inclined planes, simple screw jack – velocity ratio, mechanical advantage, efficiency.

UNIT III

Statics: Principles of statics, types of forces, concurrent and non-concurrent forces, composition of forces, forces in a plane and space, simple stresses and strains, elastic coefficients, trusses and Indeterminate trusses.

UNIT IV

Kinematics: Fundamentals of rectilinear and curvilinear motion, application of general equations, concept of relative velocity, analytical and graphical techniques.

UNIT V

Dynamics Principles of dynamics, D'Alembert's principle, conservation of momentum and energy, vibrations of simple systems.

REFERENCE BOOKS:

1. Popov, E. P., Engineering Mechanics of Solids, Pub.: Prentice Hall, 1998.
2. Shames, I. H. and Rao, G. K. M., Engineering Mechanics – Static and Dynamics, Pub.: Pearson Education, 2009.
3. Beer, F. P., and Johnson Jr. E. R., Vector Mechanics for Engineers, Pub.: McGraw Hill, Year of publication: 2009.
4. Rao, J. S. and Gupta, K., Introductory Course on Theory and Practice of Mechanical Vibrations, Pub.: New Age International, 1999.
5. Kumar, K. L., Kumar, V. Engineering Mechanics, Pub.: Tata McGraw Hill, 2011.
6. Palanichamy, M. S., and Nagan, S., Engineering Mechanics – Statics & Dynamics, Pub.: Tata McGraw Hill, 2002.
7. Timoshenko, S. and Young, D. H., Engineering Mechanics, Pub.: McGraw Hill, 2006.

BEC 104
[COMMUNICATION SKILLS]

UNIT-I

Communication: Meaning, process, barriers to communication. Importance of communication skills for engineering students and job seekers. Verbal and nonverbal communication. Role of body language in one's personality.

UNIT-II

Review of English Grammar: Tense [teaching and learning by practice]. Sentence completion. Verbal analogies. Verbs of daily use [at least a vocabulary of 500 words]. Advance vocabulary for GRE, GATE, IELTS, TOEFL and Pearson's Test, SAT. Variety of spoken English [with special emphasis on pronunciation]. Reading Comprehension

UNIT-III

Writing Skills: Letter writing: formal and informal. Applications, Report writing, Note writing, Email etiquette, Resume making

UNIT-IV

Listening Skills: Introduction to listening. Difference among listening, hearing and overhearing. Traits of a good listener. Barriers to effective listening and tips for effective listening.

UNIT-V

Presentation skills: Introduction to presentation and its importance, Purposes of presentation, Analyzing audience, Effective presentation through visual aids and proper body language. Interview skills.

References Books:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul, Dr Brati Biswas

BEC 105
[ENGINEERING GRAPHICS]

UNIT I

Scales: Representative factor, plain scales, diagonal scales, scale of chords. **Conic sections:** Construction of ellipse, parabola, hyperbola by different methods; Normal and Tangent. **Special Curves:** Cycloid, Epi-cycloid, Hypo-cycloid, Involutives, Archimedean and logarithmic spirals.

UNIT II

Projection: Types of projection, orthographic projection, first and third angle projection, **Projection of points and lines**, Line inclined to one plane, inclined with both the plane, True Length and True Inclination, Traces of straight lines.

UNIT III

Projection of planes and solids : Projection of Planes like circle and polygons in different positions; Projection of polyhedrons like prisms, pyramids and solids of revolutions like cylinder, cones in different positions.

UNIT IV

Section of Solids: Section of right solids by normal and inclined planes; Intersection of cylinders. **Development of Surfaces** : Parallel line and radial - line method for right solids.

UNIT V

Isometric Projections: Isometric scale, Isometric axes, Isometric Projection from orthographic drawing. **Computer Aided Drafting (CAD):** Introduction, benefit, software's basic commands of drafting entities like line, circle, polygon, polyhedron, cylinders; transformations and editing commands like move, rotate, mirror, array; solution of projection problems on CAD.

Reference Books:

1. Visvesvaraya Tech. University; A Premier on Computer Aided Engg drawing; VTU Belgaum
2. Bhatt N.D.; Engineering Drawing, Charotar
3. Venugopal K.; Engineering Graphics; New Age
4. John KC; Engg. Graphics for Degree; PHI.
5. Gill P.S.; Engineering Drawing; kataria
6. Jeyopovan T.; Engineering drawing & Graphics Using AutoCAD; Vikas
7. Agrawal and Agrawal; Engineering Drawing;TMH

Elective

BEC 106 (A)
[PRINCIPLES OF MANAGEMENT]

UNIT-I

Overview of Management: Definition - Management - Role of managers - Evolution of Management thought- Organization and the environmental factors – Trends and Challenges of Management in Global Scenario.

UNIT-II

Planning: Nature and purpose of planning - Planning process - Types of plans – Objectives - Managing by objective (MBO) Strategies - Types of strategies - Policies – Decision Making - Types of decision - Decision Making Process - Rational Decision Making

UNIT-III

Organizing: Nature and purpose of organizing - Organization structure - Formal and informal groups / organization - Line and Staff authority - Departmentation - Span of control Centralization and Decentralization - Delegation of authority - Staffing Selection and Recruitment - Orientation - Career Development - Career stages – Training Performance Appraisal.

UNIT-IV

Directing: Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles - Leadership theories - Communication - Barriers to effective communication - Organization Culture - Elements and types of culture – Managing cultural diversity.

UNIT-V

Controlling: Process of controlling - Types of control - Budgetary and non-budgetary control Q techniques - Managing Productivity - Cost Control - Purchase Control – Maintenance Control - Quality Control - Planning operations.

Reference books:

1. Hellriegel, Slocum & Jackson, ' Management - A Competency Based Approach', Thomson South Western, 10th edition, 2007.
2. Harold Koontz, Heinz Weihrich and Mark V Cannice, 'Management - A global
3. Stephen P. Robbins and Mary Coulter, 'Management', Prentice Hall of India, 8th edition.
4. Charles W L Hill, Steven L McShane, 'Principles of Management', Mcgraw Hill Education, Special Indian Edition, 2007.

BEC 106 (B)

[IMPACT OF SCIENCE & TECHNOLOGY ON SOCIETY]

UNIT-I

Human-Centered Social Framework/Human Capital: This theme combines the focus on new economic theory and human capital with the role of entrepreneurship and innovation, placing them in a wider theoretical context. Human Capital is a central unifying theme of the Academy's work and also a central strategy for breaking out of the narrow conceptions and stifling economic policies that prevail now. The theme also focuses on the catalytic role of the individual in social change, exemplified in economy by the role of entrepreneurs. It also encompasses the issue of human rights and economic rights, including the right to employment.

UNIT-II

The Network Society: This theme focuses on Social Capital and is a complement to the one on Human Capital. Organization is a determinant of social productivity and human welfare. The theme here is the creative role of organization in social development, the enormous productive potential generated by advances in social organization and the opportunities to utilize innovative organizational models and delivery systems to accelerate social progress in business, education, scientific research and governance. Traditional economic theory and contemporary preoccupation with fiscal and monetary policy ignore the tremendous potential for organizational innovation as a stimulus to social change. A comprehensive strategy for addressing social problems needs to give sufficient prominence to this aspect.

UNIT-III

Economic theory and real economy: The Newtonian view of economics, in particular, and social science in general ignores important theoretical advances in the physical sciences and critical aspects of economic reality. This theme could actually encompass a wide range of issues related to economic theory in an intellectually challenging manner which would include contributions from non-economists. **Re-valuing Nature:** Current theories based on the efficiency of markets overlook the gross inefficiency of economic systems that seek to maximize return to investors by wastefully consuming natural resources or grossly undervaluing and underutilizing human capital. Economic thought and practice are reoriented to take into account the real value of natural and human resources to present and future generations and formulate effective public policies designed to optimize the efficiency of the overall social system. This theme should re-examine the concept of economic value and its role in promoting sustainable human welfare and well-being. Energy plays the central role in society's relationship with the environment: this theme can also highlight the potential for new and alternative energy sources.

UNIT-IV

The Global Workplace or Global Employment Challenge: Like climate change, the challenge has become global and requires a wider understanding of the multiple factors affecting job creation and retention, including trade, demography, aging, migration, technological development, tax policies, Internet, global sourcing, production strategies, outsourcing, resource depletion, etc. The notion of regional and global economies raised here has direct relevance to the Euro zone and EU.

Recognizing Talents and Genius -- education for the 21st Century: A comprehensive social strategy must give a central place to the role of education and training in preparing youth for productive engagement in a rapidly changing and increasingly complex and sophisticated world. The Internet is set to become the main delivery system for expansion of the global educational system to meet the rapidly expanding needs of developing countries. It also has an essential role to play in vocational training to close the gap between the need and availability of skilled individuals in the workforce. One of the challenges will be to prepare youth for entrepreneurship and self-employment.

UNIT-V

Sharing Knowledge, Innovation & Creativity for Human Welfare: This theme covers the broad issue of how to make available to industrial applications the existing large amount of scientific knowledge and technical innovations. Particular emphasis will be given to the development of a sustainable human welfare, including the field of health care, which is one of the world's fastest growing industries, accounting for more than ten percent of the economy in most developed nations. The general awareness is increasing on this topic, but the management of S&T needs to develop instruments and a consensus to promote data sharing and economic exploitation in developing countries. **Freedom and equality:** This theme, that should address the lack of balance between developed and developing countries, is very much in keeping with the programmes of the International Higher Education and Research Centers operating in Trieste, often in close collaboration with UNESCO, such as the International Centre for Theoretical Physics, which hosted the Forum.

References books:

1. Bijker, W. E., Hughes, T. P., Pinch, T. and Douglas, D. G., *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, MIT Press, Cambridge, 2012
2. Bohman, James (1998). "The Coming of Age of Deliberative Democracy". *The Journal of Political Philosophy*. 6 (4): 400–425
3. Feenberg, Andrew (1995). *Alternative Modernity : The Technical Turn in Philosophy and Social Theory*. University of California Press.
4. Goldman, Steven L. "No Innovation Without Representation: Technological Action in a Democratic Society." *New Worlds, New Technologies, New Issues* (1992): 148-60.
5. Allison, Bill, and Sarah Harkins. "Fixed Fortunes: Biggest Corporate Political Interests Spend Billions, Get Trillions." *Sunlight Foundation Blog*. Sunlight Foundation, 17 Nov. 2014. Web. 21 Apr. 2015.

BEC 106 (C)
[BASIC COMPUTER ENGINEERING]

UNIT I

Introduction To Computers: Classification, Generations, Applications, Basic blocks of a digital computer. Number Systems: Decimal, Binary, Octal, Hexadecimal – Conversions. Logic Gates: Definition symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR Gates, Simple application in developing combinational logic circuits.

UNIT II

Personal/ Micro Computers: Computer Peripherals (Monitor, Keyboard, Mouse, Speaker, CD/DVD ROM), Inside CPU Box: Motherboard, I/O Cards, Cables, HDD, CD-Drive. Mother Board In Detail: Nomenclature, technology, standards CPUs(AMD, INTEL, Cyrix), CPUs: CPU over clocking, troubleshooting, CPU problems, Chip Sets(AMD, Intel, VIA, SIS, OPTI).

UNIT III

Memory: Basic Concept, Types of Memory, Memory Chips(RAM, ROM), Logical and Physical organization of memory in computer, Cache Memory. Pc-Assembly And CMOS Setup and Troubleshooting: SMPS, Identification of cables and computers Ports, Mounting Motherboard in cabinet, Fitting of cabinet, CMOS – Setup Troubleshooting.

UNIT IV

Basic of Printers & Scanner:-Types of printers and printing mechanism, Dot Matrix printers, laser printer, Ink jet printer, line printer, Installation of a printer driver, Troubleshooting printers. Working principles of Scanner, Barcode Scanner.

UNIT V

LAPTOP: Introduction of laptop and comparison of various Laptops, Block diagram of laptop & description of all its sections, Study of parts of a laptop, Input system: Touchpad, Trackball, Track point, Docking station, Upgrade memory, hard disk, replacing battery, Configuring wireless internet in a laptop.

References :

1. Hardware bible By : Winn L Rosch, Techmedia publications
2. Trouble shooting, maintaining and repairing PCs By : Stephon J Bigelow Tata McGraw Hill Publication
3. Modern All about printers By : Manohar Lotia, Pradeep Nair, Bijal Lotia BPB publications.
4. Charles H.Roth Jr. Fundamentals of Logic design – 4th edition – Jaico publishing house
5. Hayes – Computer Architecture and organization – TMH 1998

Practical Work

1. Switch Board Wiring and Testing

2. Soldering and De-Soldering Practice
3. Voltage Measurement of Different Circuits
4. Testing and Measurement of SMPS
5. Assembling of a Computer
6. Installation of different Operating Systems
7. Installation of different device drivers
8. Installation of different Application Software
9. Installation and Troubleshooting of Printer
10. Installation and Troubleshooting of Scanner
11. To Repair and Troubleshooting of SMPS, Monitor and Motherboard
12. Identification of Ports and Cables used in PC
13. Troubleshooting PC (Step by Step)
14. Wireless network configuration in laptop